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AN EXAMINATION OF THE ROLE OF COMMUNICATION PROBLEMS IN PREVENTABLE MEDICAL ADVERSE EVENTS

by

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Preface

A few years ago, I was standing in the lobby of the Eglin Air Force Base Family Practice Clinic when one of the staff physicians ran through the clinic, glanced at me, and rushed out the door. Little did I know that moment was going to change both of our lives. The physician was rushing to deliver a baby. The baby was born totally neurologically devastated as a result of medical errors committed by the staff physician and others. Medical investigators determined that the root cause of this tragedy was poor communication among the medical staff. A few months later I was tasked to help develop a communication program for medical healthcare professionals in an effort to prevent such tragedies from occurring in the future. I have traveled extensively during the past 24 months talking to groups about medical team communication. This study is a continuation of my interest in this subject.

I have many people to thank for helping me in this study. First, Bill Nichols and Jean Carroll, the Eglin AFB Librarians, helped me assemble the articles for the literature review. Next, Lt Col Meghan Pilger not only gave me access to the case files for this study, but she provided me with encouragement and guidance. The staff in the ACSC Research Department, especially Pam Hollabaugh, helped me navigate the template maze. Finally, Maj London Richard diligently read my drafts and provided extensive feedback and guidance for this project.

Abstract

This exploratory, descriptive study examined 30 medical malpractice case files and 30 medical incident investigations to identify the prevalence of three barriers to effective communication among healthcare professionals. These cases were randomly selected from the files of the Office of the Air Force Surgeon General. Barriers included problems with encoding and decoding information, hierarchical structure of teams, and time pressures and workload. The results of this study indicated that communication errors were present in 76 percent of the cases examined. A total of 92 communication problems were noted. Verbal and written communication problems were equally distributed. Nurse and physician miscommunication was as common as physician-to-physician miscommunication. Eleven cases were noted as having hostile work environments. Only two cases involved problems with communication as the result of time pressures or workload. The study concludes a broad-based program that facilitates communication throughout healthcare facilities may help decrease medical errors. Suggestions for further research are given.

Chapter 1

Introduction

> *The number of deaths caused by medical errors is equivalent to three jumbo jets crashing every two days*
>
> —Lucian L. Leape

Medical errors or preventable medical adverse events (PMAES) constitute one of the leading health concerns in the United States. The Institute of Medicine (IOM) estimates that PMAES cause between 44,000 and 98,000 U.S. deaths each year.[1] Additionally, PMAES result in 1.6 million serious injuries and cost $29 billion in lost wages and health care expenses.[2] Department of Defense (DoD) healthcare facilities are not immune from PMAES. One study estimated that there are more than 15,000 medical errors committed in the 200 military healthcare facilities each year.[3] The Office of the United States Air Force (USAF) Surgeon General processes between 250 and 300 malpractice cases annually.[4]

Researchers have found a number of causes of PMAES.[5] Among them are poorly designed equipment, inadequately trained medical providers, and simple negligence.[6] However, the leading cause of PMAES is poor communication among healthcare providers.[7,8]

The medical community has long recognized that communication among healthcare providers is poor, and solving this problem is essential to improving patient safety.[9]

Unfortunately, few researchers have studied medical team communication and PMAES.[10] The limited research available has significant shortcomings. For example, some researchers have examined communication in the workplace, but they did not directly link communication problems to PMAES. Others studies used observers. These observers documented poor communication and PMAES, but observers understandably intervened before a patient was harmed. Unfortunately, the presence of observers may influence results.[11] Additionally, observers may have intervened even though the staff might have discovered the error themselves before causing harm.[12] These studies also often lump a broad range of behaviors into the category of "communication" without further defining the construct. In other words, they failed to adequately identify a set of behaviors that constitute the problem.

This study addressed these shortcomings. First, it looked at actual PMAES by examining a random sample of medical malpractice cases and medical incident investigations from USAF healthcare facilities. Second, problems with communication were clearly defined and categorized into three specific barriers.

In this study communication problems were present in most PMAES. It also showed that problems with decoding and encoding information, team member status differences, and times pressures and workload were barriers to effective communication among medical team members.

Research Questions

Four questions guided this research. They were:

1. What is the prevalence of communication problems in PMAES?

2. Are problems with encoding and decoding written and/or oral information a key factor that contributes to PMAES?

3. What is the relationship between team hierarchal status and PMAES?

4. What is the relationship between time pressures/workload and PMAES?

Definitions

Two terms may need clarification. The first is preventable medical adverse events or PMAES. Note that the abbreviation PMAE is used when referring to a single preventable medical adverse event. The medical literature contains several terms to describe medical errors such as iatrogenic injury, mistake, and negligence. This paper uses PMAES for several reasons. PMAES delineates preventable versus unpreventable events since some medical adverse events are clearly unpreventable. For instance, if a patient has an adverse reaction to a drug they have never previously taken, this is an unpreventable adverse event. Also not all medical errors are PMAES. For example, a patient may be given the wrong medication by mistake, a medical error. However, the medication may have no effect on the patient, and therefore, this incident is not an adverse event. Several of the cited works use the term "medical error." To retain integrity with these works, the term "medical error" is used when the cited work used this phrase.

Another phrase that may need clarification is "problems with communication." For this study, communication was defined as the "*transition of information and understanding through the use of common symbols*" (italics in original).[13] Communication, therefore, includes both written and verbal expressions. Problems with communication are a disruption of this information transfer that includes not only miscommunication but also failures to communicate. For example, a problem with

communication would include a medical staff member who recognizes a problem but withholds this information.

Notes

[1] Linda T. Kohn, Janet M. Corrigan, and Molla S. Donaldson eds., *To Err is Human: Building a Safer Health Care System.* (Washington, D.C.: Committee on Quality Health Care in America, Institute of Medicine. National Academy Press; 2000), 26.

[2] Ibid.

[3] Sarah Tackett and Carmen C. Birk, "The Patient Safety Mandate—Rebuilding the Trust and Creating a Report System," *Legal Medicine 2001,* 7-15.

[4] Lt Col Meghan Pilger, Office of the Air Force Surgeon General, Risk Manager, interviewed by the author, 16 December 2001.

[5] Harold Van Cott, "Human Errors: Their Causes and Reduction," in *Human Error in Medicine.* ed. Marilyn S. Bogner (Hillsdale, NJ: Lawrence Erlbaum, 1994), 53-65.

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[7] Joint Commission on Accreditation of Health Care Organizations, *Sentinel Event Alert,* Issue 12, February 4, 2000.

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[9] John Gosbee, "Communication among Health Professionals," *British Medical Journal* 316, no. 7132 (28 February 1998), 642.

[10] Ibid.

[11] John M. Ivancevich and Michael T. Matteson, *Organizational Behavior and Management* 4th ed. (Chicago, IL: Irwin Press, 1996), 32.

[12] Robert L. Helmreich and Ashleigh C. Merritt, *Culture at Work in Aviation and Medicine: National, Organizational, and Professional Influences.* (Brookefield, VT: Ashgate Publishing. 2000), 13.

[13] Ivancevich and Matteson, 489.

Chapter 2

Literature Review

Communication between healthcare professionals is a mess.

—John Gosbee

The Problem

The problem of medical errors is hardly a new phenomenon. In 1964, Schimmel discovered 20 percent of patients in a university setting were injured by a physician's errors and 20 percent of those injuries were fatal.[1] Another study, published in 1981, found a 36 percent medical error rate with one quarter of the incidents being fatal.[2]

In 1991 the Harvard Medical Practice Study published equally alarming medical error rates. These researchers estimated that medical errors cause as many as 180,000 patient deaths and another 1.3 million are seriously injured.[3] In this study Leape and his colleagues surveyed 30,195 records from a random sample of 51 New York State hospitals. They identified 1,133 patients who suffered adverse events for an error rate of 3.7 percent, of which 70 percent of these events were preventable.[4] The Harvard Medical Practice Study was a cornerstone of the IOM report.[5]

Besides the IOM report, a number of sensationalized stories of physicians removing healthy limbs by mistake have raised public awareness of this problem. In the past two

years, hospitals have reported 108 such surgeries to the Joint Commission on Accreditation of Healthcare Organizations (JCAHO).[6]

As a subset of the healthcare community, the DoD experiences numerous PMAES each year. In a study of medical errors and near misses during calendar year 2000, ten USAF hospitals reported a total of 785 errors. Eighty-seven of those errors were considered serious. The overall error rate was estimated at 1.05 per 2,000 visits. Tackett and Birk extrapolated this data to the remaining 200 military healthcare facilities and estimated that 15,600 medical errors occur and 1,740 patients are harmed annually in DoD healthcare facilities.[7]

The conclusion that "medical errors" are a serious health problem has not gone unchallenged. Some physicians simply dismissed the statistics as ridiculous based upon their own experiences. Others like McDonald et al. have disputed the IOM findings.[8] They argued that the study's screening criteria was flawed, and consequently, the numbers were exaggerated.[9] Leape countered that the numbers were not only accurate but also underestimated.[10] He argued that because many events are not recorded in medical records, and that autopsies reveal 20 to 40 of patients die with undiagnosed but serious illness, the number of PMAES may be twice as high.[11] In addition, Leape's research only looked at inpatient adverse events. Although the majority of PMAES occur in this setting, some occur in primary care. Fisher, Fetters, Munro, and Goldman found an adverse rate of 3.7 per 100,000 outpatient clinic visits of which 14 percent suffered serious injury and 3 percent died.[12] Additionally, fewer than five percent of medical errors are ever reported.[13] Therefore, PMAES may be even higher.

Another argument against PMAE studies is that medicine deals with "sick" people, many of whom have serious illnesses. The death rates in medicine are somewhat understandable considering the situation of many of the patients. Leape even admits that patient acuity is increasing.[14] However, the fallacy of this argument is that the underlying problem is not death rates, but error rates. The Harvard Medical Study found that 4 percent of hospitalized patients experience an adverse event.[15]

The IOM report and others have compared this error rate to other "high risk" industries such as nuclear power and aviation. The error rates in these industries are well below 1 percent. In fact, the chances of being injured in an aviation mishap are 1 in 8 million flight compared to medicine where the rate is 2,640 per 100,000.[16,17] The IOM report endorses adopting principles of aviation safety and applying them to medicine.[18]

What Causes PMAES?

The traditional approach to understanding PMAES is to identify offenders and assign blame.[19] In other words, adverse events are often perceived as nothing more than individual negligence. However, modern medicine is rarely about one individual taking care of another individual.[20] Today a patient enters a healthcare system, and this system treats his or her illness. A team of physicians, nurses, and other healthcare providers work together to provide care.

Today's approach to understanding PMAES is not on the individual but on breakdowns in the complex medical system.[21] Specifically for this study, it is hypothesized that PMAES are often by caused problems in the human medical system—the medical team.

Communication and Teamwork in Medicine

"Medical error reduction is fundamentally an information problem. The solution to reducing the number of medical errors resides in developing mechanisms for collecting, analyzing, and applying existing information," according to Dr. Dennis O'Leary, President of JCAHO.[22] Dr. O'Leary was speaking broadly with this statement, but its application to adverse events is clear. PMAES often occur when healthcare providers do not have the right information when treating patients. In other words, communication problems cause errors.

Communication among health professionals is notoriously poor.[23] It is often inefficient and chaotic—even dangerous at times.[24] Gosbee concluded poor communication among healthcare professionals "is the chief culprit behind avoidable errors in clinical practice, which can lead to injury and even death."[25]

Teamwork is also a problem. For example in a study of 1,033 operating room personnel, Sexton, Thomas, and Helmreich found significantly different perceptions of the levels of teamwork.[26] While the majority of surgical residents and attending surgeons rated teamwork as high, the supporting staff rated it low. Additionally, in a sample of 225 USAF hospital personnel, only 42 percent of staff agreed with the statement, "There is a strong sense of teamwork in our work area."[27]

Communication and teamwork problems cause numerous medical errors.[28] JCAHO has charged that the majority of wrong site surgeries are the result of communication between surgical team members that is often incomplete or inaccurate.[29] In particular, other team members, such as nurses and technicians who could assist in identifying sites, are excluded from the process.[30] An Australian hospital study reported

miscommunication as the most common cause of PMAES that result in death or disability.[31] Compared to medical skills deficits, miscommunication was twice as likely to be the cause of a medical error.[32] A study of American operating rooms likewise found poor communication was a leading cause of errors.[33] These studies clearly demonstrated that broad problems with communication lead to medical errors. Unfortunately, they failed to specify the elements of communication that lead to the errors.

Donchin et al.'s study of communication in intensive care units added some clarity to the elements of communication that cause errors.[34] During a four-month study of medical errors in an intensive care unit (ICU), researchers found that an average 1.7 medical errors occurred per patent per day. Extrapolating the data to all patients in the ICU, the researchers estimated more than 1,000 medical errors occurred in the ICU during the period of the study. Communication problems, especially between physicians and nurses, were cited as the leading cause of these errors. Miscommunication between these professionals was noted in 37 percent of medical errors; despite the fact these providers only spent a small percentage of their duty day communicating.[35]

One problem with Donchin et al.'s study, as it relates to this report, is that it did not examine actual PMAES. Since observers stopped participants from committing serious mistakes, it is difficult to know how many of these mistakes might have been caught or which mistakes would have ultimately led to a PMAE.

Elements of Communication

These studies indicate that communication problems are a major contributor to medical errors. The problem is that while they have identified the problem as a lack of

communication, they failed to address the underlying causes of the problem. In this section, three possible causes of the problems of communication in medicine are discussed—problems with encoding and decoding information, team hierarchical structure, and time pressures.

These three barriers were chosen for two reasons. First, the IOM report mentions these barriers as possible causes of PMAES.[36] Leape also argues that time pressures and poorly written records may contribute to mistakes.[37] Second, these communication elements are discussed in Crew Resource Management (CRM) training given to aviators.[38] CRM teaches aircrews about the role of human factors in aircraft mishaps. The IOM report argued that a similar program might help save lives in medicine.[39] Several CRM programs for medicine are currently being used.[40] Since the aviation industry's safety improvement programs are held as an example for the medical industry, using some aviation safety principles for this study makes sense.

Encoding and Decoding of Information

Communication at its most basic element is a process of information transfer from one person to another. Ivancevich and Matteson define communication as the "*transition of information and understanding through the use of common symbols*" (italics in original).[41] The most widely used model of communication involves six steps. First, communicators come up with information or an idea they wish to convey to another. They assemble their ideas into verbal or nonverbal symbols (or encode them) and send them to someone else. The message is sent via a medium, such as a telephone, policy statement or face-to-face communication. The receiver then decodes the message. Decoding is symbolic interpretation and, of course, subject to the receiver's own thought

processes. Finally, in effective communication processes, feedback is given to the original communicator. The entire system is surrounded by "noise" that threatens to distort the information. "Noise" can literally be noise, but it is more likely to involve barriers to communication, such as time pressures or superior-subordinate problems.[42]

A survey of more than 1,000 physicians and nurses revealed that encoding and decoding information was a significant concern.[43] The healthcare providers reported the majority of communication in their facility was either unclear or not given to the appropriate party. It was interesting to note that physicians and nurses had different perceptions of the levels of communication. Although physicians perceived themselves as having more communication training than nurses, nurses ranked "the doctor using better communication skills" as the top difficulty in obtaining needed information about a patient. This study admittedly had some shortcomings. It relied upon subjective self-assessments rather than direct observations, and the data was collected from only one hospital. More importantly for the current study, the researchers did not examine the relationship between encoding and decoding problems and patient safety.[44]

Coiera and Tombs conducted an observational study of medical teams in a community hospital.[45] They found numerous examples of inefficient team communications. They offered this specific example. "A senior consultant tried to transfer a patient to another's team by delegating the request, involving at least two intermediaries. By the time the second consultant received the message it was substantially distorted and had the potential to endanger the patient."[46]

The following case from Avery also highlights the problem with encoding and decoding information between physicians from different specialties.[47] The case began

when the patient consulted a gastroenterologist for abdominal pain. After the physician's initial work-up was negative, the gastroenterologist sent the patient for a computerized axial tomography (CAT) scan. The ensuing conversation between the physician and the radiologist was confusing. While the radiologist noted multiple abnormalities, her conclusion was that the examination was "essentially within normal limits." After a lengthy conversation and written report, the patient's physician interpreted the radiologist's diagnosis as "no finding," while the radiologist thought the results were inconclusive. A year later a new physician discovered the patient had lymphoma. After reviewing the CAT scan, he concluded this was an extension of a disease that was evident on the original scan.[48]

These final two examples show that misinterpretation of information can be catastrophic. However, they are anecdotal, and no specific study of problems involving encoding and decoding has been conducted.

Team Hierarchical Structure

Medicine has numerous hierarchical structures. First, there is a hierarchy based upon occupation. Physicians have historically been placed above nurses in this hierarchy and registered nurses over less qualified nurses. Helmreich and Merritt observed, "All physician groups have higher status than surgical or anesthesia nurses and do not hesitate to invoke their authority."[49] Even into the 1970s, nurses at many facilities were expected to stand and give their seats to physicians during staff meetings. There is also a hierarchy based upon medical specialty. Surgeons are perceived to hold the highest level while general practitioners arguably hold the lowest.[50] Finally, status is based upon position. In some residency programs, the length of coat that a physician wears further indicates

their position. For example, interns will have the shortest white coats while attending physicians have the longest.[51]

Team hierarchical structures or status differences affect communication on several levels.[52] Those higher on the structure may disregard the inputs of "subordinates" because they perceive a credibility gap.[53] Subordinates may also filter information in order to avoid conflict.[54] According to Ivancevich and Matteson, "Rather than look incompetent, a nurse may prefer to remain quiet instead of expressing an opinion or asking a question of a nurse supervisor."[55]

Several studies have examined the barriers presented by team hierarchical structures. In an examination of the role of poor communication in operating rooms, Helmreich and Merritt found, "One of the frequent problems was a failure to inform others of what one was doing. Many of the other weaknesses centered on leadership and unwillingness of juniors to question the actions of seniors. In many instances, those with critical information remained silent."[56]

Overall, Helmreich and Merritt found that surgeons failed to brief other operating room personnel on the plan for surgery, speak up about problems with patients and work overload, or discuss alternative courses of actions.[57] This study was observational, and errors were stopped or mitigated before any harm was done to the patient. The problem, of course, is that it is very difficult to determine which errors would have ultimately been PMAES. The presence of the observers may have also impacted the results—the so-called "Hawthorne Effect."[58]

MacKay, Matusno, and Mulligan found that hierarchies could hinder effective communication.[59] Their survey of 426 nurses and 123 physicians showed that physicians

clearly had more problems communicating to nurses than other physicians. Likewise, nurses had more problems communicating with physicians than with other nurses. The conclusion of the researchers was that the primary factor in the level of communication was whether the organizational environment supported open communication between physicians and nurses.[60]

Team hierarchical structures may lead to "status incongruency" that fosters conflict or hostile work environments.[61] Hostile work environments may also foster PMAES. A survey in the OR Manager found that verbal abuse is a common problem in operating rooms.[62] Twenty-one percent of participants reported experiencing disruptive behavior by operating room team members at least once per week. Forty-four percent believed this behavior places patients at risk.[63]

The evidence supports the conclusion that the hierarchical structure of medicine is a significant barrier to communication. The IOM report recommended that medicine must "develop a working culture in which communication flows freely regardless of authority gradient."[64] However, prior research fails to adequately link the hierarchy with PMAES.

Time Pressures and Workload

Time pressures and provider workload are the final barriers to effective communication. Time pressure imposes an added dimension to the communication process that may result in information being passed unclearly or significant parties being left out of the channels of communication.[65] Provider workload is interconnected with time pressures. Someone who has too many tasks to accomplish will be pressured for time and may experience work overload.[66]

Although medical environments are often hurried even chaotic, few studies of time pressures have been conducted.[67] Instead, time pressures and workload appear to be discussed in the context of fatigue and sleep deprivation.[68] Despite strong evidence that these factors contribute to mistakes in other fields, no clear link has been established between fatigue and poor job performance in medicine.[69] Likewise, work overload has been shown to increase errors in non-medical fields.[70] However, in medicine a connection between work overload and errors is suspected but not proven.[71]

Conclusions from the Relevant Literature

Communication problems among health care professionals are well documented and, in general, are seen as a significant contributor to PMAES. Unfortunately, little seems to be known about actual communication problems that contribute to PMAES. This study will take a closer look at communication in actual PMAES. Specifically, it will examine the problems with encoding and decoding, team hierarchical structure, and time pressure communication barriers leading to PMAES.

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[3] Troyen A. Brennan, et al., "Incidence of Adverse Events and Negligence in Hospitalized Patients: Results of the Harvard Medical Practice Study," *New England Journal of Medicine* 324, (7 February 1991): 370-376.

[4] Ibid.

[5] Linda T. Kohn, Janet M. Corrigan, and Molla S. Donaldson eds., *To Err is Human: Building a Safer Health Care System.* (Washington, D.C.: Committee on Quality Health Care in America, Institute of Medicine. National Academy Press; 2000), 25-48.

[6] "Agency warns of increase in wrong surgeries." Fox News Channel: Fox News Story. 5 Dec 2001, n.p. On-line. Internet, 12 Dec 2001. Available from http://www.foxnews.com/story/0,2933,40268,00.hmtl.

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[7] Sarah Tackett and Carmen C. Birk, "The Patient Safety Mandate—Rebuilding the Trust and Creating a Report System," *Legal Medicine 2001,* 7-15.

[8] Clement J. McDonald, Michael Weiner, and Siu L. Hui, "Deaths Due to Medical Errors are Exaggerated in Institute of Medicine Report," *Journal of the American Medical Association* 284, no. 1 (5 July 2000): 93-94.

[9] Ibid.

[10] Lucian Leape, "Institute of Medicine Medical Error Figures are Not Exaggerated," *Journal of the American Medical Association* 284, no. 1 (July 5, 2000): 95-97.

[11] Ibid.

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[16] Kohn, Corrigan, and Donaldson, 71.

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[19] Kohn, Corrigan, and Donaldson, 49.

[20] Fred P. Stone, "Medical Team Management: Using Teamwork to Prevent Medical Errors," *Legal Medicine 2001,* 30.

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[22] Senate. *Statement of the Joint Commission on Accreditation of Healthcare Organizations, February 22, 2000.*

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[24] Ibid.

[25] John Gosbee, "Communication Among Health Professionals." *British Medical Journal* 316, no. 7132 (28 February 1998): 642.

[26] Quoted in Robert L. Helmreich and Ashleigh C. Merritt, *Culture at Work in Aviation and Medicine: National, Organizational, and Professional Influences.* (Brookefield, VT: Ashgate Publishing, 1998), 745-749.

[27] Stone, 31.

[28] Joint Commission on Accreditation of Health Care Organizations, *Sentinel Event Alert*, Issue 12, February 4, 2000.

[29] Joint Commission on Accreditation of Health Care Organizations, "Lessons Learned: Wrong Cite Centuries," *Sentinel Event Alert,* Issue 6, 28 August 1998.

[30] Ibid.

[31] "14,000 preventable deaths in Australian Hospitals," *British Medical Journal* 310, (1995): 1487.

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[33] Robert L. Helmreich and Ashleigh C. Merritt, *Culture at Work in Aviation and Medicine: National, Organizational, and Professional Influences.* (Brookefield, VT: Ashgate Publishing, 1998), 168.

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[38] CRM Manual, ATS CRM 95-1A.

[39] Ibid.

[40] Helmreich and Merritt, 172.

[41] John M. Ivancevich and Michael T. Matteson, *Organizational Behavior and Management* 4th ed., (Chicago, IL: Irwin Press, 1996), 489.

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[43] Ruth C. MacKay, Kiyo Matusno, and Jon Mulligan, "Communication Problems Between Doctors and Nurses," *Quality Assurance in Health Care* 3, no. 1: 11-19.

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[47] J. Kelley Avery, "Communication Between Physicians at Fault," *Tennessee Medicine* (Nov 1998), 419-420.

[48] Ibid.

[49] Helmreich and Merritt, 12.

[50] Ibid, 41.

[51] These conclusions are based on conversations with the staff of the Eglin AFB Family Practice Residency program, where I served as the Director of Behavioral Science from 1998 to 2001.

[52] Ivancevich and Matteson, 501,502.

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[54] Ibid, 501.

[55] Ibid, 502.

[56] Helmreich and Merritt, 168.

[57] Ibid, 170.

[58] Ivancevich and Matteson, 32.

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[64] Kohn, Corrigan, and Donaldson, 178.
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Chapter 3

Method

This research was an exploratory, descriptive study of the three communication barriers and their relationship with PMAES. It used both quantitative and qualitative methods.

Sample

A random sample of 30 malpractice case files and 30 medical incident investigations (MII) were selected for this study. These cases were on file at the Office of the USAF Surgeon General, Bolling Air Force Base, D.C.

There are differences in MIIs and malpractice case files, although both are investigations into potential PMAES. Malpractice cases involve patients or their families filing legal claims against the government for death or injury. The essential element of the malpractice case file is whether the "standard of care"[1] for the case was met. A file contains a summary of the case, as well as the opinions of different professionals whether the treating healthcare professional met the standard of care. It also has the opinions of the physicians, although their lawyer often provided their "side" in writing. All of these cases resulted in some amount of financial compensation. However, the records often contained differing opinions about who committed the medical errors or whether a

medical error was even committed.[2] The medical events themselves occurred between 1991 and 2000, but all of the malpractice cases had been settled within the past year.

The primary goal of a malpractice case is to determine whether financial payment should be made to a plaintiff. MIIs, on the other hand, evaluate patient care and the health care system. According to Air Force Instruction 44-119, "The primary focus of the MII is on how the system contributed to the outcome; however, investigators are not restricted from commenting on the appropriateness of care delivered by individual providers or services."[3] MIIs are usually conducted on cases involving "unexpected or preventable death, significant injury, self-inflicted harm, or attempted/actual suicide while under the care of military Air Force medical services."[4] Unlike malpractice cases, MIIs focus heavily on human factors, such as fatigue, stress, and motivations. They also examine communication and other operational factors. Furthermore, MIIs contain witness interviews, although there are differences in the records. For example, some MIIs had transcribed witness statements, while other MIIs summarized witness testimony.

All MIIs and malpractice case files were essentially investigations into adverse medical events, but in the end, there was often disagreement on whether the event was preventable or even caused by the actions of the provider. Regardless, files contained sufficient information to examine the role of communication in the events.

Variables

The study examined problems with encoding and decoding, team hierarchical structure, and time pressures/workload. These variables, or barriers to communication, were not mutually exclusive as one problem with communication could involve three

barriers. The goal of this research, however, was not to distinguish the strength of these variables to each other. Instead the goal was to understand their prevalence in PMAES.

Problems of Encoding and Decoding

Problems of encoding and decoding were defined as information not conveyed clearly. This contained three possible levels. First, verbal information was relayed, but the receiver misunderstood the message. Second, written information was provided, but it was misinterpreted or misread by the reader. Finally, information was available, but the message was not conveyed to other team members. If investigators determined that a medical record should have been available or reviewed, then it was counted towards this variable.

Team Hierarchical Structures

A problem with communication potentially caused by hierarchical structures was the second variable. When records indicated problems with communication, the pattern of the staff interactions was documented. These included combinations of information transferred between physicians, nurses, technicians or others.

Workplace hostility was examined as a sub-variable of team hierarchical structures. Records were examined to determine whether there were clear indications of hostility in the work place or personal problems between the various medical staff. Only patterns were noted, as it would be overly speculative to conclude that this variable actually caused a PMAE, unless these were findings of the investigators.

Time Pressures and Workload

The final variable examined was time pressures and workload. This variable was noted if the case investigators determined that the medical staff was rushed when the adverse event occurred. This variable also included whether staff was experiencing heavy workload demands or if shift change occurred during the PMAE. Like team hierarchical structure, it is difficult to determine whether time pressures or workload actually caused a PMAE. Therefore, the presence of the variable was noted but no conclusions of causation were made.

Selection

Two selection methods were used for this study. For the malpractice cases, the last thirty cases that were closed in 2001 calendar year were selected. The researcher had no prior knowledge of the cases, and since they were not filed by any particular category, they were essentially randomized. Cases ranged from mild to severe PMAES, and payouts were as low as $3,000 to several million. The MIIs were selected from four drawers. The investigator selected 30 cases at random by blindly selecting from these drawers. Since the cases had blank covers, the investigator had no way of knowing the contents of the folder prior to selection.

Analysis

The researcher used a question format to assess each record (Appendix A). The prevalence of problematic communication was recorded in relation to the three barriers. After answering these questions, a short summary of each case was developed. As cases

were reviewed, special attention was paid to the history of the case and the interviews with the healthcare providers involved in the process.

Identified barriers were noted when communication problems were cited by investigators as contributing to the PMAE. Problems with communication that did not contribute to the ultimate outcome were recorded but not used in the final analysis.

Both quantitative and qualitative methods were used to analyze the data. The quantitative analysis included compiling the data and using descriptive statistical methods. The results are displayed in terms of ranges and averages. The qualitative methods entailed drafting a summary sheet of the data and then creating sets of responses consistent with three variables used for this study. Some of these summaries including quotes are reported.[5]

Notes

[1] Standard of care is "a written statement describing the rules, actions, or conditions that direct patient care. Standards of care guide practice and can be used to evaluate the performance of caregivers." Walter D. Glantze, Kenneth N. Anderson, and Lois E. Anderson, eds. *The Signet Mosby Medical Encyclopedia Revised Edition* (St. Louis, MI: Signet, 1996), 720.

[2] One aspect of this review that surprised this researcher was the degree to which physicians disagreed with each other as to whether the "standard of care" had been met. Often different reviewers reached different conclusions and in one case, when all the reviewers agreed that a settlement was indicated, the USAF Surgeon General cited evidence that supported denying the claim.

[3] Air Force Instruction (AFI) 44-119. *Clinical Performance Improvement.* 4 June 2001.

[4] Ibid.

[5] Qualitative research methods may be less well known, but when complemented with quantitative methods can yield a much clearer understanding of a phenomenon. Denzin and Lincoln define qualitative research as "multimethod in focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings that people bring to them." Qualitative research methods were ideal for this study because the researcher reviewed interviews and records. In the end, the results of this study relied to some degree upon the interpretation of this researcher. In addition, other researchers collected the research material. While

the quantitative researcher may wince at the "biases" and "subjectivity" of this analysis, the qualitative researcher counters that these terms denote an ontological realism that simply does not exist.

Guba, Egon G. and Lincoln, Yvonna S. "Competing Paradigms in Qualitative Research," in *Handbook of Qualitative Research*, ed. Norman K. Denzin and Yvonna S. Lincoln. (Thousand Oaks, CA: Sage Publications 1994), 109.

Chapter 4

Results

There are two levels between you and me. You do not speak directly with me.

—A physician's response when a technician tried to warn him of a problem

The results indicate that communication problems in PMAES are common. Forty-six of the sixty cases reviewed, or 76 percent, involved problems with communication that may have contributed to a PMAE. There were 92 total communication errors in all reviewed cases. An average of two communication errors occurred in every case where a communication problem contributed to a PMAE. The communication errors in each case ranged from one to five. Three communication errors in the record were not considered to have contributed to the PMAE by investigators. Thus, these errors were not included in the total count or statistical analysis.

Although prior research has not specifically examined the average number of communication errors per case, the finding that 76 percent of cases in the current study involve problems with communication is consistent with previous studies reporting that communication problems were a significant contributor in two-thirds of PMAES.[1]

Problems with Encoding and Decoding

Overall, when problems were noted, providers inaccurately conveyed verbal or written communication in roughly equal amounts. As Table 1 illustrates, verbal errors accounted for 47.8 percent of PMAES, while written errors occurred 52.2 percent of the time. None of the cases involved both written and verbal errors.

Table 1. Incidence and Percent of Problems of Encoding and Decoding

Variable	No. of Events	Percentage
Unclear Verbal Instructions	11	11.9
Concerns not verbalized	33	35.9
Verbal Error Total	44	47.8
Incomplete Documentation	18	19.6
Unclear Documentation	24	26.0
No record for review	3	3.3
Provider did not review	3	3.3
Written Error Total	48	52.2
Total Coding Errors	92	100.0

Forty-four verbal errors were committed for roughly 48 percent of all encoding/decoding problems (see Table 1). In nine of these cases, the problem with communication involved staff inadequately conveying the status of the patient to other staff members. Two of the cases involved phone calls to other staff members. The staffs disagreed on the content of these conversations in both of these latter cases. In one case, an ER physician repeatedly requested a surgeon come to the hospital to assist with a case. The surgeon, however, denied that he was ever asked to assist in person. His interpretation was that he was merely being consulted, and the surgeon argued that he

provided the appropriate advice. Although it might be easy to conclude that the physicians in this case were attempting to cover their mistakes by blaming each other, the less cynical conclusion was that the ER physician's communication failed to clearly convey the urgency of the case to the surgeon. Ultimately, the 13 year-old patient died in the emergency room. A less dramatic case involved assumptions of language. A physician asked for a test to be conducted "ASAP." He assumed that this meant immediately, but the receiver in the laboratory interpreted this to mean that he could place it behind his other sooner-than-routine requests. These types of problems, however, were uncommon in this sample.

The single largest contributor to PMAES was medical staff failure to "speak up." More than a third of coding problems involved someone failing to make an input when they had knowledge that might have prevented a tragedy. In one case, a surgeon even requested inputs from his surgical team, but someone still failed to express their concerns. The surgeon in this case was unsure whether the organ he was operating on was the correct one. He asked two surgical nurses if they thought it was the correct organ. One nurse was unsure. This nurse stated there was another surgeon in the facility, and she could page him for clarification. The other nurse did not say anything. The surgeon decided to remove the tissue, only to find out later that he had removed the wrong organ. In the subsequent investigation, the nurse who remained silent said that she did not think he was removing the correct tissue. However, she did not say anything because, "I don't want to get into trouble." An interesting element to this case was that the physician was well liked and considered "easy to get along with" by other staff.

Another example of communication failure involved a similar environment. In this emergency room, morale was considered high and communication among the staff excellent. Unfortunately, a delay in transferring information may have resulted in a patient's death. A newly retired Master Sergeant arrived at the emergency room of a local military facility. The triage nurse evaluated the patient and correctly assessed that the patient was experiencing a pulmonary embolism. The patient was placed in an emergency room bed, but the nurse did not inform the physician of her suspicions. During the assessment and diagnosis, the physician was misled by the patient's youthful appearance and athletic physique. The physician incorrectly diagnosed the patient with an upper respiratory infection. As the patient was leaving the emergency room, he collapsed and died. In this case, the nurse actually wrote a note expressing her concerns. However, the note was only placed into the patient's chart after the patient died.

This latter example highlights lack of documentation as another problem with written communication. In 42 cases, notes that might have prevented serious injuries were either unclear or nonexistent. In one case, a toddler was misdiagnosed for several months until ultimately physicians discovered she had a brain tumor. A primary cause of this PMAE was that the record gave an unclear description of the child's history. Because several different healthcare providers saw the child during the course of her illness, each provider relied upon the notes of previous providers. Since many of the notes were unclear, each physician appeared to treat the case as a new illness instead of a continuation of a previous problem. Several physicians attributed her "ear aches" to infections, colds, or allergies. Providers discovered and diagnosed her brain tumor only after her condition dramatically changed. By that time it was too late, and the child died.

Three cases involved patient records not being available to healthcare providers. For example because the medical record was unavailable, a family physician incorrectly assessed a patient with cardiac problems who subsequently died.[2] In the three other cases, records were readily available, yet staff members did not review them.

Team Hierarchical Structures

Team hierarchical structure was associated with PMAES. In examining this variable, records were often unclear, either about specific individuals or the exact positions that the communicants held. For example, a problem with communication may have been labeled as coming from a department instead of a person. To be conservative, only clear communication problems between specific people were included in the analysis. The results indicated problems with communication occurred almost as frequently between physicians as between nurses and physicians (see Table 2).

Table 2. Incidence of Problems with Communication Based on Position

Interactions	N	Percentage
Nurses and Physicians	11	36.7
Physicians and Physicians	10	33.3
Physicians and Others	6	20.0
Nurses and Technicians	3	10.0
Total	30	100.0

The results of this study confirm previous research reporting that physicians and nurses often have problems communicating.[3] However, current results dispute prior claims of less problematic physician-physician communication.[4] This study indicated

that when physicians speak with physicians of different specialties, problems with communication often resulted in PMAES. In all but one of the cases involving physician-physician miscommunication, the interactions involved physicians of different specialties. For example during a medical flight evacuation, a flight surgeon quickly approved transportation of a patient after only a cursory discussion with the attending physician. This attending physician was not well versed on the potential adverse impact of flight on certain medical conditions. Consequently, the patient died in part because of the stresses of flight.[5] The problem, however, did not lay in knowledge or skill deficits of these physicians. Instead, they both should have communicated their concerns about the care of the patient. Incidentally, in this case the nurses and technicians aboard the plane were concerned that the patient was not being properly monitored in flight, but they did not express this concern to the attending physician.

Another finding of this study was the amount of communication problems between different subgroups not identified in previous research. Three separate incidents involved miscommunication between a physician's assistant and a physician. Another situation involved a physician misinterpreting a written report prepared by an audiologist. There were also three cases where "mental health" failed to pass on patient information to primary care physicians and other medical staff.

A number of cases involved poor communication between civilian and military hospitals, as well as problems when different military medical facilities communicated with each other. Poor communication between healthcare facilities was noted in five PMAES. In two cases, problems were related to the inability of overseas facilities to contact stateside hospitals concerning the continued care of patients. In another case, the

relationship between the military and civilian hospital was described as “adversarial,” and vital patient information was not shared.

Adversarial or hostile work environments appeared to contribute to PMAES in 11 different cases. One event highlights this problem. A 19 year-old patient came to the emergency room complaining of chills, cough, and back pain. Her symptoms included elevated pulse, low-blood pressure, and a temperature of 105.4 degrees Fahrenheit. She was discharged although there was no significant change in her symptoms. Her condition deteriorated upon returning home and she died. In this case a nurse knew the patient’s vital signs were still elevated, but the nurse did not express her concerns to the physician. She noted that the physician “wouldn’t have listened—Once he makes up his mind that’s it.” During the investigation, a technician was asked if he had “problems” with this physician. The technician replied that on one occasion he brought a concern to this particular physician, but the physician stated, “There are two levels between you and me and you don’t talk to me.” Needless to say, the technician was then hesitant to provide input in future situations. The morale in this unit was reportedly low.

In another case, eight individuals were involved in the care of a patient who was injured as the result of miscommunication. The investigators noted that staff meetings were poorly attended, and there were a variety of personality conflicts between staff.

It should be noted that high morale in medical units did not necessarily mitigate PMAES. In three cases, the investigator noted very high staff morale.

Time Pressures and Workload

Only two cases involved staff under time pressures or high workload situations, and investigators did not view these factors as causing the PMAES. In one PMAE case,

nurses were rushed completing a discharge summary, and consequently they omitted important patient information. In another case, a nurse and physician talked as they rushed to the operating room. Overall, PMAES were not the result of time pressures or high workloads in this current study.

Notes

[1] Joint Commission on Accreditation of Health Care Organizations, "Lessons Learned: Wrong Cite Surgery," *Sentinel Event Alert*, Issue 6, 28 August 1998.

[2] Normally, a patient is able to give an adequate history to help physicians evaluate their problems. In this case, the patient was unable and possibly unwilling to give enough information. The medical chart as the investigation showed would have changed the diagnosis of the physician.

[3] Yoel Donchin et al., "A Look into the Nature and Causes of Human Errors in the Intensive Care Unit," *Critical Care Medicine* 23, no. 2 (February 1995): 294-300.

[4] Ibid.

[5] This case is a good example where either the flight surgeon could be blamed for improperly evaluating the patient or the attending could be held liable since he was the patient's doctor. Neither action, however, answers the more important question of why two highly trained physicians did not do a better job in coordinating the care of the patient.

Chapter 5

Discussion

The results of this study confirmed that problems with communication are correlated with PMAES. More importantly, this study showed that communication errors are more than some nebulous entity that pervades medicine. These errors can be broken down into various component parts. This study showed that problems of encoding and decoding were significant contributors to PMAES. Although this study could not show that team hierarchical structures caused PMAES, it did indicate that communication between physicians, nurses, and other healthcare providers is often problematic. It did find evidence that hostile work environments may play a role in PMAES. Finally, this study found that few PMAES occurred in time pressured or heavy workload environments.

This study suggests several areas that, if improved, could help reduce medical errors. Team member assertiveness is the most significant area. In more than one third of these cases, team members possessed valuable, even life saving, information that was not shared with other healthcare providers. This fact suggests that medical team members need to be empowered to verbalize their concerns. Combined with the data presented on hostile work environments, this study also suggests that hospital leaders (especially physicians) must facilitate healthy interactive work environments that promote teamwork and allow for inputs from all members.

Record keeping is another area for improvement. In 45.6 percent of the documented cases with communication problems, written notes were either unclear, or information was never written down. In three cases, no patient record was available. In military medicine patients typically see a variety of different health care providers. The medical record allows continuity of care, and it is the key to communicating essential patient information between physicians. Certainly the focus on accurate record keeping in hospital inspections is warranted. Dictating notes may improve legibility since these notes are typed instead of handwritten. Of course, a drawback of dictation is increased "turn around" time. Transcribers can also misunderstand, misinterpret, or incorrectly type a physician's note. Computerized medical records may reduce many of these problems.

A number of errors occurred in hostile work environments. If errors are to be reduced, hospital leadership must improve relationships and actively work towards eliminating "factioning" of the medical staff.

The current study found that medical events rarely occur because an individual or small group gets rushed. Problems develop over time, often involving a number of different professions. Medical providers must have a "team" focus with all members emphasizing quality and continuity of care. Every patient arriving at a military health care facility must be treated as if they were entering a single unit, not a specific department. This study suggests that teaching general teamwork principles within and between different healthcare facilities will create a safer environment for patients.

Answers from Aviation

Aviation is often cited as a model of improved safety that could be applied to medicine.[1] The conclusion of the IOM authors was that an essential part of creating a safer environment would be to focus on systems and teamwork, and the aviation industry could offer some solutions.[2] Aircrews learn CRM. CRM teaches a set of operational tools that include "inquiry, seeking relevant operational information, advocacy, communicating proposed actions, conflict resolution, and decision making."[3] Simply put, aircrews learn the essential elements of communication and teamwork—elements that are sometimes missing in medicine.

The DoD is currently considering adopting two programs based upon CRM to provide safer medical care and facilitate better teamwork. MedTeams uses CRM in high-fidelity simulators with medical teams to promote a strong sense of teamwork and more effective patient care. Among other things, MedTeams is designed to instill a positive work environment and mutual respect among members. The program also helps team members maintain situational awareness by encouraging each member to offer information necessary for decision-making.[4] Dynamic Research Corporation, the creators of MedTeams, claims to have cut emergency room errors in half.[5]

Medical Team Management (MTM) is another program that applies the principles of CRM. MTM is directly derived from the United States Air Force CRM program. It is currently being taught to all critical care areas in USAF healthcare facilities. MTM focuses on seven critical success elements: daily operating strategy, situational awareness, workload performance, available resources, policy/regulations, command

authority, and communication.[6] MTM also helps medical staffs overcome communication barriers.

Both programs hold some promise. The problem with applying CRM to medical settings is that CRM has never been empirically demonstrated to reduce aviation mishaps.[7] Additionally, MedTeams assumes that medical errors are committed in high workload, time pressured environments. However, as this research has shown, few PMAES in USAF settings occur in these circumstances. On the other hand, MTM teaches broader communication skills, which is consistent with the results and recommendations of this study.

Limitations

There are several limitations to this study. First, not all of the cases contained PMAES, and in some cases it was debatable whether the adverse event could have been prevented.[8] In addition the reliance upon malpractice cases and MII files meant that this investigator was essentially getting the information "second," even "third" hand. Therefore, the information for this study relied upon the investigative skills of those who conducted the initial investigations.

In addition, the communication barriers included in this study were limited. No consideration was given to the possibility that the healthcare professionals interviewed for the investigations gave patently false information. Making false statements would not be surprising considering the liability involved in malpractice cases.

Another limitation of this study is that it did not have a control group. Therefore, no comparison between communication problems in PMAES and non-PMAES was possible.

It is conceivable that there is no significant difference between the amounts of communication problems in these two different groups.

Given the parameters of this study, malpractice cases were less helpful than MII cases. Because malpractice cases concern legal questions of negligence, the focus was less on systems and more on individual culpability. As Stanhope et al. stated, "Lawyers are seldom interested in understanding why care was substandard so clinically relevant factors such as a doctor or midwife being under trained, exhausted or inadequately supervised are rarely considered (and are not seen as relevant in court)."[9] Despite this limitation, however, the malpractice cases did yield many examples of communication problems as causal factors in the PMAES.

Another limitation of this study was that it relied upon one investigator. Attempts to get a second investigator to provide interrater reliability were unsuccessful. Another investigator may come to different conclusions when examining the same data. To help minimize this issue, this investigator only noted communication problems when the record clearly indicated that this was a problem. Finally, this study focused on United States Air Force PMAES. Considerable caution should be exercised when generalizing these results to other populations.

Future Research

Malpractice cases and MII were not designed as research tools. There is wide variability in the data documented in these records, depending on the nature of the case and the individuals conducting the investigations. Malpractice case file are designed to evaluate standard of care, and thus they are less valuable in evaluating specific factors such as communication. MIIs, however, are designed to investigate many factors

including communication in general. Further investigations could include more specific communication factors to examine such as the ones presented in this study. This may provide more robust data in the future.

In addition, this researcher recommends more research in general on the role of communication in medical errors. This study has only touched the surface of this problem, and further research is needed.

Notes

[1] Linda T. Kohn, Janet M. Corrigan, and Molla S. Donaldson eds., *To Err is Human: Building a Safer Health Care System.* (Washington, D.C.: Committee on Quality Health Care in America, Institute of Medicine. National Academy Press; 2000), 65.

[2] Ibid.

[3]Laura Pizzi, Neil I. Goldfarb, and David B. Nash, "Crew Resource Management and its Applications in Medicine," in *Making Health Care Safer: A Critical Analysis of Patient Safety Practices,* ed. by Kaveh G. Shojania et al. (Rockville, MD: AHRQ Publication, 2001), 505-514.

[4] Stephen D. Small, "Demonstration of High-fidelity Simulation Team Training for Emergency Medicine," *Academic Emergency Medicine* 6 (1999): 312-322.

[5] Pizzi, Goldfarb, and Nash, 506.

[6] Fred P. Stone, "Medical Team Management: Using Teamwork to Prevent Medical Errors," *Legal Medicine 2001,* 26-30.

[7] Pizzi, Goldfarb, and Nash, 507.

[8] In many of the malpractice cases, physicians vehemently disagreed with each other whether certain conduct was negligence or whether the mishap was preventable.

[9] Nicola Stanhope et al., "Applying Human Factors Methods to Clinical Risk Management in Obstetrics," *British Journal of Obstetrics and Gynaecology* 104, (November 1997): 1225-1232.

Appendix A

1. Was there a problem with communication in this case?

2. What was the number of miscommunicated events?

3. How many of these events were contributing factors in the adverse medical outcome?

4. What was the nature of the miscommunication? (i.e. Was there a failure to communicate information that was formally required? Was there an informal obligation? Was the communication written or oral? Was information unknown to the parties involved?)

5a. What was the social status between all those who failed to communicate? Describe each.

5b. What was the sex of those involved? Describe each and the direction of the communication.

5c. Was there evidence of a hostile work environment (i.e. hostility between people).

5d. Was there a history of hostility between those who have miscommunicated?

6a. Was there time pressure involved in the miscommunication? Describe.

6b. Did the miscommunication occur during shift change?

6c. Were the participants experiencing a heavy workload (as defined by the investigator) during the event?

7a. Are there problems with encoding and decoding of information? Describe.

7b. Was the communication oral or written.

Summarize the case:

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